SPECIAL REPORT 215

UPDATE OF MINERAL LAND CLASSIFICATION: CONCRETE AGGREGATE IN THE SAN LUIS OBISPO-SANTA BARBARA PRODUCTION-CONSUMPTION REGION, CALIFORNIA

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2011

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March 19, 2012

Department of Planning & Building Director
County of San Luis Obispo
976 Osos Street, Room 300
San Luis Obispo, CA 93408

Re: Transmittal of California Geological Survey's Special Report 215 on Update of Mineral Land Classification: Concrete Aggregate in the San Luis Obispo – Santa Barbara Production-Consumption Region, California

To Whom It May Concern:

At its Regular Business Meeting held on March 8, 2012, the State Mining and Geology Board (SMGB) accepted California Geological Survey's Special Report 215 on Update of Mineral Land Classification: Concrete Aggregate in the San Luis Obispo – Santa Barbara Production-Consumption Region, California.

The above referenced report is being transmitted to your office pursuant to Public Resources Code Article 2, Sections 2761 and 2762, for establishment of Mineral Resource Management Policies (MRMP) to be subsequently incorporated in your general plan. The SMGB looks forward to the opportunity to review and comment on your proposed MRMP.prior to adoption.

Please do not hesitate to contact me should you have any questions.

Sincerely,

Stephen M. Testa
Executive Officer

cc: Dr. John Parrish, State Geologist and Director of the California Geological Survey
John Clinkenbeard, Minerals Resources Unit, California Geological Survey

EXECUTIVE SUMMARY

This report updates the mineral land classification for concrete aggregate in the San Luis Obispo-Santa Barbara Production-Consumption Region. The mineral land classification of the area was previously described in California Department of Conservation's Division of Mines and Geology (now California Geological Survey) Special Report 162 – *Mineral Land Classification: Portland Cement Concrete Aggregate and Active Mines of All Other Mineral Commodities in the San Luis Obispo-Santa Barbara Production-Consumption Region* – published in 1989. Special Report 162 emphasized the classification of portland cement concrete-grade aggregate resources, but also classified active mines of other mineral commodities such as asphaltic concrete aggregate, base, subbase, fill, and diatomite that were being mined in the region at that time.

This report presents a reevaluation and update of concrete (portland cement concrete-grade and asphaltic concrete-grade) aggregate resources in the San Luis Obispo-Santa Barbara Production-Consumption Region for the benefit of local lead agencies in the region. Deposits that meet the specifications for concrete aggregate are among the scarcest and most valuable construction aggregate resources. The broader category of "construction aggregate" includes materials that meet the specifications for concrete aggregate but also includes lower grade materials that are used in products such as base, subbase, and fill.

This report also provides an updated 50-year projection of construction aggregate needs for the San Luis Obispo-Santa Barbara Production-Consumption Region through the year 2060. This report does not update or alter the status of other mineral resources previously classified in Special Report 162.

In this update report, the following conclusions are reached:

- The 75 million tons of currently permitted construction aggregate reserves are projected to last through the year 2026, 16 years from the present (2010).
- In this update report, an additional 2,991 acres of land containing concrete aggregate resources are identified in areas in and near the San Luis Obispo-Santa Barbara Production-Consumption Region.
- The anticipated consumption of construction aggregate in the San Luis Obispo-Santa Barbara Production-Consumption Region for the next 50 years (through the year 2060) is estimated to be 263 million tons, of which 137 million tons must be concrete-grade. This is 57 million tons more than the prior 50-year projection made in 1989.
- An estimated 10,700 million tons of concrete aggregate resources are identified in the San Luis Obispo-Santa Barbara Production-Consumption Region.

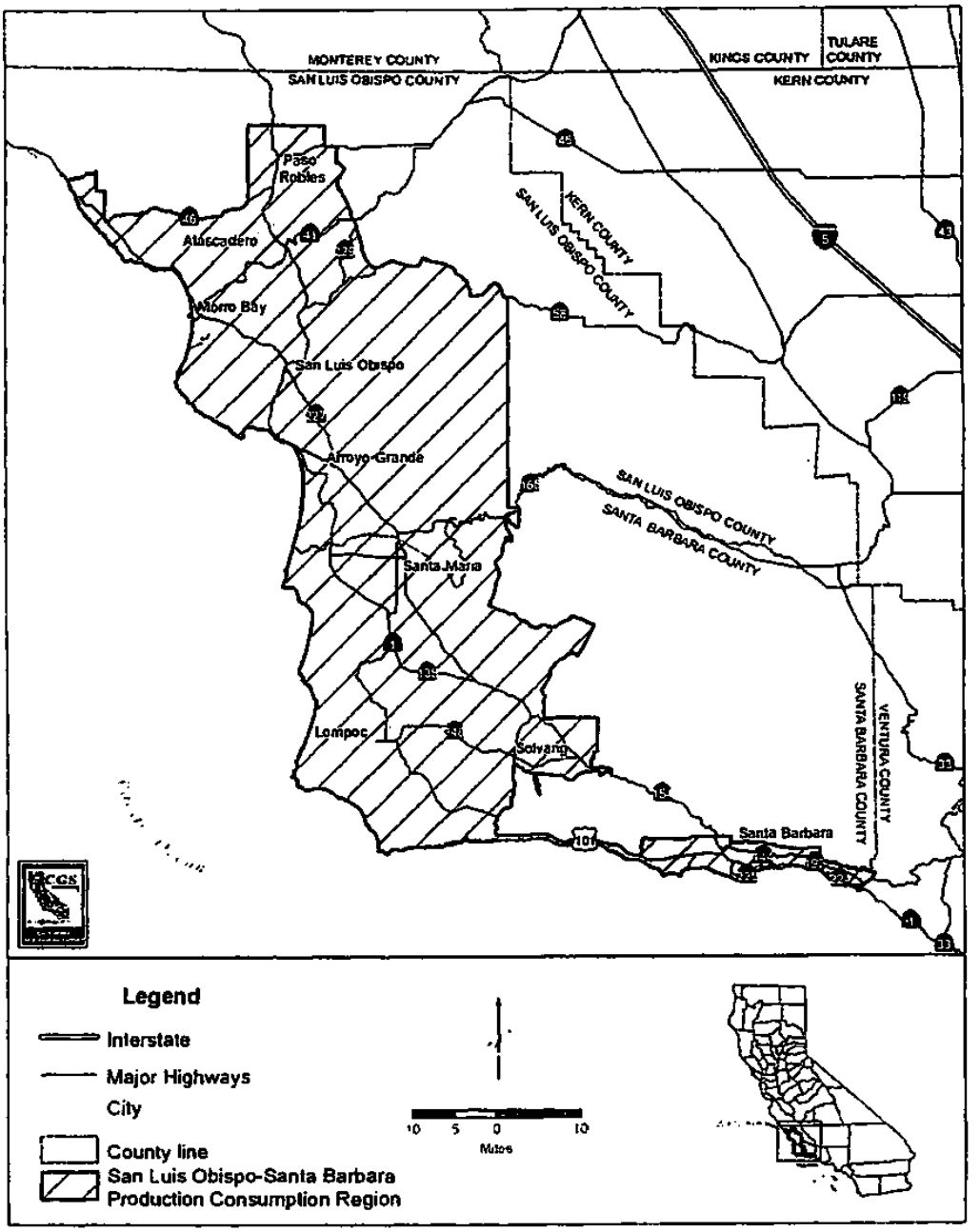

Figure 1. General location map of the San Luis Obispo-Santa Barbara P-C Region.

material percentages, and deposit densities are used to calculate total tonnages of aggregate *reserves* and *resources* within each Sector. Reserves are deposits permitted for mining; resources are all aggregate deposits identified by Sectors, including the permitted reserves.

5. Forecast of 50-Year Needs and the Life Expectancy of Current Reserves: The total tonnage of aggregate needed to satisfy the demand in the study area over the next 50 years is estimated by multiplying the projected population over that period with the average annual per-capita rate of total aggregate consumption derived from historic population and production data. Results of this forecast are used to estimate the date of depletion of current reserves in the Region.

6. Identification of Alternative Resources: Alternative sources of aggregate are identified and briefly discussed.

When the determination of the study boundary for the San Luis Obispo-Santa Barbara P-C Region originally was made in the mid-1980s, the region produced about 90 percent of the aggregate consumed within the Region. Information provided by the aggregate producers indicates that in 2009, imports of aggregate from outside of the Region were still approximately 10 percent of the total aggregate consumed in the region.

OVERVIEW OF DESIGNATION

This update report contains the classification step of the classification-designation process provided for in SMARA. The designation phase follows the receipt and acceptance of this classification report by the Board. *Designation* is the formal recognition by the Board, after consultation with lead agencies and other interested parties, of areas containing mineral deposits of regional or statewide economic significance. Procedures for the designation of lands containing significant mineral deposits are specified in Section II.2 of the Board's Guidelines for Classification and Designation of Mineral Lands (California State Mining and Geology Board, 2000).

LEAD AGENCY RESPONSE TO CLASSIFICATION

The Board, upon receipt of the classification information from the State Geologist, transmits the classification report to the appropriate lead agencies and makes it available to other interested parties. Within 12 months of receipt of the report, each lead agency must develop and adopt mineral resource management policies to be incorporated in its general plan. These policies will:

1. Recognize the mineral land classification information, including the Mineral Land Classification Maps transmitted to the lead agency by the Board.

2. Emphasize the conservation and development of the identified mineral deposits.

Lead agencies that have land-use jurisdiction within the San Luis Obispo-Santa Barbara P-C Region are shown in Table 1. The information in this update and the revised projection of aggregate needs in the region should be used by the lead agencies in evaluating the effectiveness of their current mineral resource management policies and in planning for future construction aggregate demands in their jurisdictions. These plans should be updated if necessary.

Table 1. Lead agencies in the San Luis Obispo-Santa Barbara P-C Region (County and incorporated city governments).

LEAD AGENCY	Lead agencies with active aggregate operations within their jurisdiction	Lead agencies with land classified as MRZ-2 for concrete-grade aggregate within their jurisdiction
County of San Luis Obispo	•	•
City of Arroyo Grande		
City of Atascadero	•	•
City of Grover City		
City of Morro Bay		
City of Paso Robles	•	•
City of Pismo Beach		
City of San Luis Obispo		
County of Santa Barbara	•	•
City of Buellton		•
City of Carpinteria		
City of Goleta		
City of Guadalupe		
City of Lompoc		
City of Santa Barbara		
City of Santa Maria		•
City of Solvang		•

RoXsand, Inc. (formerly Troesh Ready Mix, Inc.) operates a sand and gravel pit in the Santa Maria River north of the City of Santa Maria. They produce PCC-grade aggregate.

AGGREGATE PRODUCTION DATA

Aggregate production data for the San Luis Obispo-Santa Barbara P-C Region for the years 1990 through 2009 were derived from annual mine production data collected by the California Department of Conservation's Office of Mine Reclamation. Production figures for 1987 were gathered from producers by CGS in 1987; the production figures for 1988 and 1989 were extrapolated from 1987 and 1990 data.

As shown in Table 3, aggregate consumption in the San Luis Obispo-Santa Barbara P-C Region has ranged from 5.5 million tons (2003 and 2005) to 2.5 million tons (2009)—the last year production figures are available. Since the time of the original report (SR 162, 1989) nearly 90 million tons of aggregate have been consumed in the Region. This represents an average annual aggregate consumption rate of 6.6 tons per capita.

Table 3. Population, Estimated Construction Aggregate Consumption (all grades), and Per Capita Consumption in the San Luis Obispo-Santa Barbara P-C Region 1988-2009.

Year	Population	Estimated Annual Consumption (tons)*	Per Capita Consumption (tons/person)
1988	553,165	3,241,000	5.9
1989	558,764	3,241,000	5.8
1990	564,363	3,592,000	6.4
1991	569,962	2,878,000	5.0
1992	575,561	3,230,000	5.6
1993	581,160	2,756,000	4.7
1994	586,759	3,235,000	5.5
1995	592,358	3,717,000	6.3
1996	597,958	3,537,000	5.9
1997	603,557	4,243,000	7.0
1998	609,156	4,777,000	7.8
1999	614,755	5,255,000	8.6
2000	620,354	4,784,000	7.7
2001	627,951	5,042,000	8.0
2002	635,509	5,221,000	8.2
2003	641,719	5,541,000	8.6
2004	647,604	4,843,000	7.5
2005	652,677	5,533,000	8.5
2006	656,829	4,762,000	7.3
2007	661,584	4,040,000	6.1
2008	667,941	3,823,000	5.7
2009	673,551	2,532,000	3.8
		Total 89,823,000	Average 6.6

* Consumption = regional production + net imports/s. Aggregate consumption figures are rounded to the nearest 1,000 tons.

PART IV – UPDATED ESTIMATE OF 50-YEAR CONSUMPTION OF AGGREGATE IN THE SAN LUIS OBISPO-SANTA BARBARA P-C REGION

The Board, as specified in its guidelines for classification and designation of mineral land (California State Mining and Geology Board, 2000), requires that mineral land classification reports for regions containing construction materials classified as MRZ-2 include "An estimate of the total quantity of each such construction material that will be needed to supply the requirements of both the county and the marketing region in which it occurs for the next 50 years. The marketing region is defined as the area within which such material is usually mined and marketed. The amount of each construction material mineral resource needed for the next 50 years shall be projected using past consumption rates adjusted for anticipated changes in market conditions and mining technology." This section contains the revised estimate of aggregate needs for the San Luis Obispo-Santa Barbara P-C Region, projected through the year 2060.

CORRELATION BETWEEN AGGREGATE CONSUMPTION AND POPULATION

Past studies of production-consumption regions in California have shown a correlation between the amount of aggregate consumed and the population of the market area (Anderson and others, 1979). An aggregate report for Los Angeles County (Miller, 1994) includes a statistical analysis of aggregate consumption versus population suggesting that roughly two-thirds of the variation in aggregate consumption could be attributed to population variance. The fact that large market regions such as Los Angeles County show a correlation between aggregate production and population indicate that population is a major factor in determining aggregate consumption in many areas. Other factors, such as major public construction projects can randomly add large amounts of aggregate to consumption figures. The economy also has a strong influence on aggregate demand, but the simple factor of population was selected because it most influences aggregate demand over long periods of time.

A comparison of the projected aggregate demand for the San Luis Obispo-Santa Barbara P-C Region from SR 162 (1989) and actual production data for the period of 1988 to 2009 is shown in Figure 2. Using an annual per capita consumption rate of 6.0 tons, SR 162 projected that the demand for aggregate in the San Luis Obispo-Santa Barbara P-C region for 1988-2009 would be 75 million tons. Actual aggregate consumption in the San Luis Obispo-Santa Barbara P-C Region for 1988-2009 was approximately 90 million tons. The difference between projected demand and actual consumption—15 million tons—was 20 percent greater than projected. This difference was likely caused by slightly greater population growth than previously projected and also by higher rates of construction during the 1995-2005 time period.

Population data for the San Luis Obispo-Santa Barbara P-C Region for the years 1988 to 2009 were obtained from census tract data from the U.S. Census Bureau (2010) for the 1990 and 2000 censuses. The populations of complete census tracts within the P-C Region were summed with the partial populations of partial tracts. The population of partial tracts was estimated based on the percentage of the included area. Population for each year between the decennial census years was interpolated. The average per capita aggregate consumption rate for the years 1988 through

2009 was 6.6 tons per person per year (Table 3). This rate was used for projecting future aggregate demands within the P-C Region.

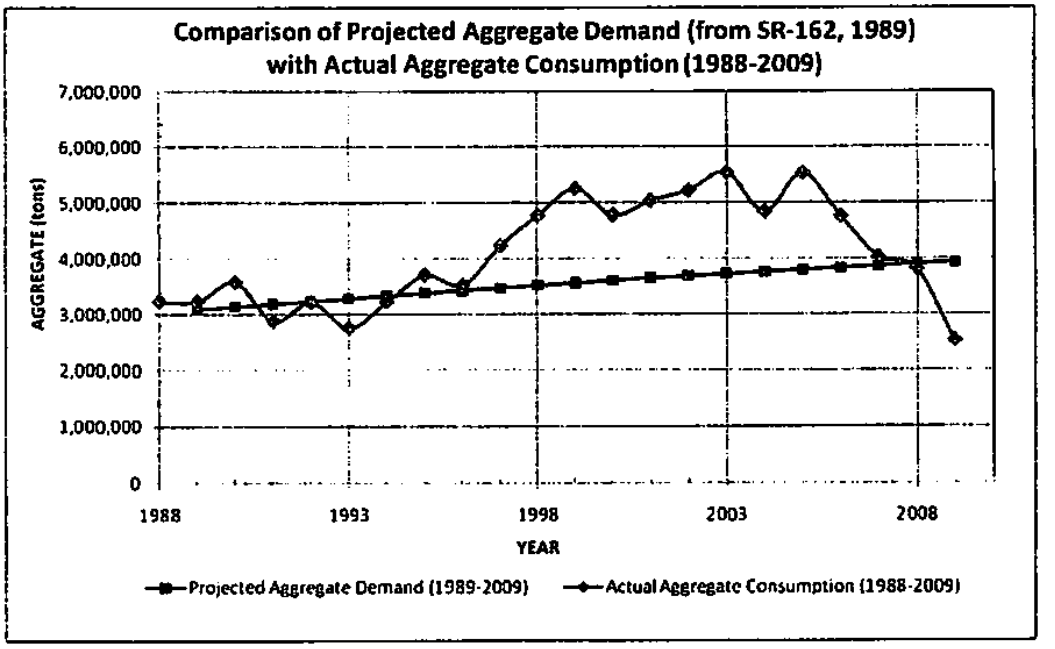

Figure 2. Comparison of projected demand in the San Luis Obispo-Santa Barbara P-C Region with recorded aggregate consumption, 1988-2009.

POPULATION PROJECTION FOR THE SAN LUIS OBISPO-SANTA BARBARA P-C REGION THROUGH THE YEAR 2060

The year-2000 population for the census tracts within the P-C Region was divided by the total year-2000 population of San Luis Obispo and Santa Barbara counties. The resulting ratio was used to estimate the San Luis Obispo-Santa Barbara P-C Region's future population for the years 2010, 2020, 2030, 2040 and 2050.

The population projection for the San Luis Obispo-Santa Barbara P-C Region was derived from official projections for counties published by the California Department of Finance's Demographic Research Unit (California Department of Finance, 2010) and the population percentage factor for the P-C Region, cited above. Report 06 P-1(on the California Department of Finance's website) provides population projections for counties in California for the years 2010, 2020, 2030, 2040 and 2050. Yearly population estimates were interpolated from the bracketing 10-year projected population numbers and extrapolated for the years 2051 through 2060. The population of the San Luis Obispo-Santa Barbara P-C Region is projected to increase from 684,127 in 2011 to 912,003 in 2060, an increase of about 33 percent.

PROJECTED AGGREGATE DEMAND FOR THE SAN LUIS OBISPO-SANTA BARBARA P-C REGION THROUGH THE YEAR 2060

An analysis using projected population and annual per capita consumption rate, derived by methods described in preceding sections, was used to forecast the aggregate demand of the San Luis Obispo-Santa Barbara P-C Region through the year 2060. The calculated annual per capita consumption rate of 6.6 tons (from Table 3) was multiplied by the projected annual population for each year through the year 2060 to produce the projected aggregate demand shown in Table 4.

The result of this projection shows that an estimated 263 million tons of aggregate will be needed to satisfy future demand in the San Luis Obispo-Santa Barbara P-C Region through the year 2060. Of this total, it is estimated that approximately 52 percent, or 137 million tons, will be used in PCC and AC, with the remainder being used in other construction aggregate products. This percentage is based on estimates by the producers of current aggregate usage. This updated 50-year demand for the period 2011 to 2060 is nearly 30 percent higher than the 50-year demand projected in 1989 to 2038 in SR 162.

COMPARISON OF THE 50-YEAR AGGREGATE DEMAND WITH CURRENT CONCRETE-GRADE AGGREGATE RESERVES

The total concrete-grade aggregate reserves of 75 million tons (see Table 2) in the San Luis Obispo-Santa Barbara P-C Region are projected to last 16 years (into the year 2026, see Figure 3). If all of the concrete-grade aggregate reserves were to be used exclusively as concrete aggregate, the supply would theoretically last 30 years (into 2041). In reality, 48 percent of the concrete-grade aggregate reserves likely will be used for other lower grade aggregate products such as base and subbase, and a depletion date of 2026 is considered more realistic. However, even this date may be optimistic. An important consideration is that not all of the aggregate reserves may be minable under existing permits because of operating restrictions or because of expiration dates that may not allow reserves to be completely mined.

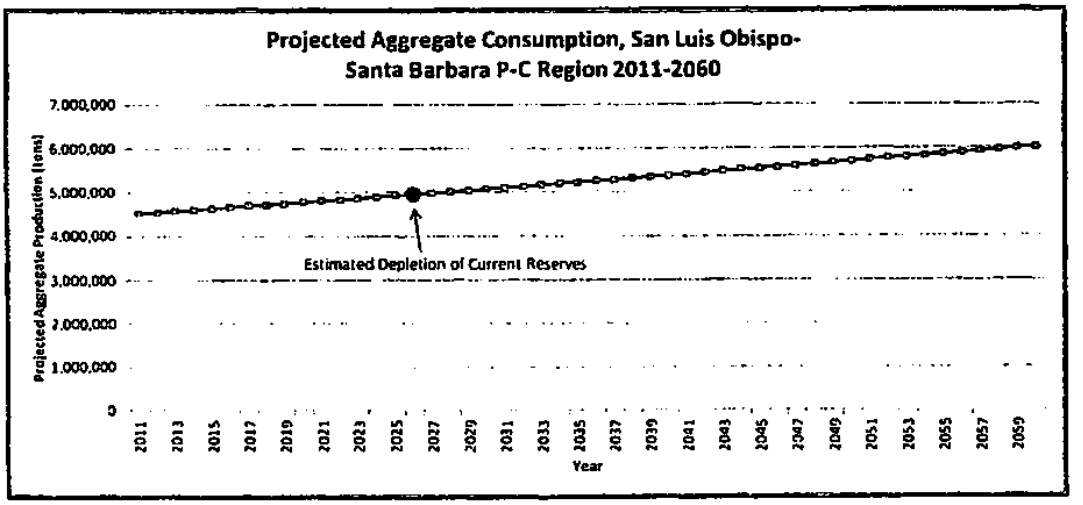

Figure 3. Projected construction aggregate demand in the San Luis Obispo-Santa Barbara P-C Region 2011-2060.

Comparing regional needs to available reserves and resources demonstrates the construction aggregate resource issues confronting the P-C Region. This includes the need to plan carefully for the use of lands containing these resources and the need to consider the permitting of additional aggregate resources in the region before currently permitted deposits are depleted.

Table 5 summarizes the identified aggregate resources and estimated future aggregate demands for the San Luis Obispo-Santa Barbara P-C Region. The projected lifespan of the aggregate reserves assumes that mining of these reserves will continue until the reserves are depleted. In addition, should unforeseen events occur, such as massive urban renewal, infrastructure projects,

reconstruction in the wake of a disaster, or major economic recession, the demand for construction aggregate in the San Luis Obispo-Santa Barbara P-C Region may change considerably, which could alter the lifespan of the aggregate reserves.

Table 5. Summary of concrete-grade aggregate reserves, projected 50-year demand, and depletion date for the San Luis Obispo-Santa Barbara P-C Region.

Estimated Concrete-Grade Aggregate Resources	**10.7 Billion Tons**
Concrete-Grade Aggregate Reserves	**75 Million Tons**
Projected 50-Year Construction Aggregate Demand (all aggregate grades)	**263 Million Tons**
Projected 50-Year Demand for Concrete-Grade Aggregate	**137 Million Tons**
Estimated Years Until Depletion of Current Concrete-Grade Aggregate Reserves	**16 Years**
Estimated Depletion Date of Concrete-Grade Aggregate Reserves	**2026**

SPECIFIC PLANS IN THE SAN LUIS OBISPO-SANTA BARBARA P-C REGION

San Luis Obispo and Santa Barbara counties have taken an important step in their planning process that is intended to ensure future access to a large part of their concrete-grade aggregate resources. Both counties have adopted Specific Plans designed to serve as the primary land use and regulatory guides for mining and reclamation in the Plan areas. The overall goals of these plans are to provide for the long term production and conservation of aggregate resources in a manner compatible with existing surrounding land use, while minimizing adverse impacts to the environment. A 12-mile section of the Santa Maria and Sisquoc rivers is covered by a Specific Plan (Santa Barbara County, 1997; and San Luis Obispo County, 1998) adopted by both counties, and the Rocky Canyon Quarry area is included in a Specific Plan (San Luis Obispo County, 1998) adopted by San Luis Obispo County.

The plans set forth goals, objectives, and policies for resource utilization and protection, and environmental protection, as well as operation, reclamation, and monitoring criteria. All actions taken by the regulatory agencies involving plan review and approval for mining and reclamation within the Plan area must be consistent with these Plans. These specific plans represent significant additions to the mineral management policies of the two counties, as they include parts of the two largest PCC-grade aggregate resource areas in the P-C Region.

POTENTIAL ALTERNATIVE SOURCES OF AGGREGATE FOR THE SAN LUIS OBISPO-SANTA BARBARA P-C REGION

Potential sources of concrete aggregate, in addition to the deposits classified MRZ-2 in this update, exist within and near the San Luis Obispo-Santa Barbara P-C Region. The potential sources within the region are in areas that are classified as MRZ-3 and include areas underlain by Holocene alluvial deposits, Tertiary sedimentary deposits, and crystalline rocks. Too little is known about these deposits to allow more than a general description. SR 162 contains a description of these deposits in the section titled "Alternative Sources of Aggregate."

Potential sources outside of the San Luis Obispo-Santa Barbara P-C Region include the production areas in the Simi Valley and San Fernando P-C regions to the southeast. Both of these regions presently provide some aggregate to the Santa Barbara City area.

RECYCLED AGGREGATE

During the past three decades, the use of recycled inert demolition debris such as concrete rubble and slab asphalt rubble has steadily increased in California. The most recycled materials in California, by tonnage, are asphalt and concrete. Recycling programs that recover demolition rubble, such as asphalt and concrete, significantly reduce the waste-stream going into landfills and also extend the life of existing aggregate mines. However, recycled aggregate generally is not suitable for use as PCC aggregate, although some is used in AC aggregate. The bulk of recycled aggregate is used as base materials.

In the San Luis Obispo-Santa Barbara P-C Region, the rate of recycling of demolition waste is high. Based on recycler estimates, roughly 250,000 tons of recycled aggregate was reclaimed from demolished construction materials in the P-C Region in 2009. This figure will vary, depending on amounts available and demands for the products. Unless there is a large change in the use of recycled material for aggregate, there will not be a significant effect on the mining of new aggregate deposits and the projection of future demand for raw aggregate materials will not change significantly.

PART VI - CONCLUSIONS

Reevaluation and recalculation of the concrete aggregate (PCC and AC) resources in this study concludes that the San Luis Obispo – Santa Barbara P-C Region contains about 10.7 billion tons of concrete aggregate resources. This number is slightly less than the 11.2 billion tons of PCC-grade aggregate resources identified by SR 162 in 1989. The updated figure includes a decrease of about 788 million tons of concrete-grade aggregate resources (approximately 90 million tons of production, 273 million tons due to land use changes since 1989, and 425 million tons due to a change in waste factors used). Also included are the additions of about 280 million tons of AC-grade aggregate resources along the Santa Ynez River; about 5 million tons of AC-grade resources in an area along Huerhuero Creek at the northestern boundary of the P-C Region; and the PCC-grade limestone deposits at Bee Rock. The resources identified along the Cuyama River were not included in the resource base for the P-C Region at this time as that area is not currently serving the P-C Region.

Based on available historic population and production data, and population projections, the San Luis Obispo-Santa Barbara P-C Region will need 263 million tons of aggregate during the next 50 years. Of this projected demand, it is estimated that 52 percent, or 137 million tons, must be suitable for use in PCC or AC. The presently permitted concrete-grade (PCC and AC) aggregate reserves of 75 million tons represent less than 30 percent of the projected construction aggregate demand of the next 50 years. These permitted reserves are projected to last until the year 2026, 16 years from the present. If a major earthquake or similar unforeseen catastrophic event strikes the region and necessitates reconstruction, existing reserves may be depleted sooner. A comparison of the results of the current study with those of the 1989 study is presented in Table 6.